REMARKS

This is a full and timely response to the non-final Office Action mailed June 16, 2005. Upon entry of the amendments in this response, claims 1 – 11 and 16 – 26 are pending. In particular, Applicants have amended claims 1, 2, 11, and 16, have added claims 19 – 16 and have canceled claims 12 – 15 without prejudice, waiver, or disclaimer. Reconsideration and allowance of the application and presently pending claims are respectfully requested.

Any statements in the Office Action that are not explicitly addressed herein are not intended to be admitted. In addition, any and all findings of inherency are traversed as not having been shown to be necessarily present. Furthermore, any and all findings of well-known art and official notice, or statements interpreted similarly, should not be considered well known since the Office Action does not include specific factual findings predicated on sound technical and scientific reasoning to support such conclusions.

I. Election/Restrictions

The Office Action indicates that restriction to one of the following species is required under 35 U.S.C. § 121:

I. Species A: The species of Figure 1, wherein the mechanical support is isolated from the creation of the plasma.

II. Species B: The species of Figure 2, wherein the mechanical support is the anode for the creation of the plasma.

Applicants affirm the telephone election made on May 11, 2005, to prosecute Species A, corresponding to claims 1 – 11 and 16 – 18. Claims 12 – 15 have been canceled without prejudice, waiver, or disclaimer. Newly added claims 19 – 26 also read upon the elected species A.

II. Objections to the Specification

The Office Action indicates that "the disclosure is objected to because of the following informalities: On Page 1, Line 2, it is suggested to add 'now U.S. Pat. no. 6,852,195,' ."

Applicants have amended the indicated portion of the disclosure to add the suggested text. Accordingly, Applicants submit that the objection should be withdrawn.

III. Double-Patenting Rejection

The Office Action indicates that claims 1 - 9 stand rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 34 – 37 of U.S. Patent Number 6,033,587 to Martin, *et al.* ("*Martin*").

In response to the double patenting rejection, Applicants submit a terminal disclaimer pursuant to 37 C.F.R. §1.321(c). Applicants have submitted the terminal disclaimer solely to advance prosecution, without conceding that the double patenting rejection is properly based. In filing the terminal disclaimer, Applicants rely upon the ruling of the Federal Circuit that the filing of such a terminal disclaimer does not act as an admission, acquiescence, or estoppel on the merits of the obviousness issue. *Quad Environmental Tech v. Union Sanitary Dist.*, 946 F.2d 870, 874-875 (Fed. Cir. 1991).

IV. The Rejection of Claims 1 – 11 as Obvious Over *Martin* is Improper

The Office Action indicates that claims 1 – 11 are rejected under 35 U.S. C. 103(a) as being allegedly obvious over *Martin*. The Office Action indicates that "based on the earlier U.S. filing date of the reference, it constitutes prior art only under 35 U.S.C. 102(e)." (Office Action, pg. 9).

However, Applicants respectfully submit that the rejection of claims 1 – 11 under §103(a) is improper for at least the reason that *Martin* is not a proper 102(e) reference as alleged. Rather, the earliest filing date for *Martin* is September 20, 1996, while the earliest filing date of the present application is at least August 28, 1996.

Specifically, *Martin* was filed on December 3, 1997, and claims priority to:

(1) Provisional Patent Application Ser. No. 60/028,621, filed December 3, 1996;

(2) U.S. Patent Application Ser. No. 08/932,025, filed on September 17, 1997;

(3) Provisional Patent Application Ser. No. 60/026,985, filed September 20, 1996; and

(4) Provisional Patent Application Ser. No.60/026,587, filed September 20, 1996.

Accordingly, the earliest possible 102(e) date for *Martin* is September 20, 1996.

The present application, filed February 23, 2004, is a division of U.S. Application Serial No. 09/855,972, filed May 15, 2001, now U.S. Patent No. 6,852,195, which is a division of U.S. Application Serial No. 08/932,025, entitled "Method And Apparatus For Low Energy Electron Enhanced Etching of Substrates in an AC or DC Plasma Environment", filed September 17, 1997 now U.S. Pat. No. 6,258,287, which claims priority to and the benefit of the filing date of Provisional Patent Application Serial

Nos. 60/026,985, filed September 20, 1996, entitled "APPARATUS AND PROCESS FOR LOW-DAMAGE DRY ETCHING OF INSULATORS BY LOW ENERGY ELECTRON ENHANCED ETCHING IN A DC PLASMA"; 60/026,587, filed September 20, 1996, entitled "APPARATUS AND PROCESS FOR LOW-DAMAGE DRY ETCHING OF INSULATORS BY LOW ENERGY ELECTRON ENHANCED ETCHING IN AN AC PLASMA"; and is a Continuation-In-Part of U.S. Patent Application Serial No. 08/705,902, filed on ***August 28, 1996*** now U.S. Pat. No. 5,882,538 entitled "METHOD AND APPARATUS FOR LOW ENERGY ELECTRON ENHANCED ETCHING OF SUBSTRATES".

Thus, Applicants submit that *Martin* does not constitute 102(e) art for at least the reason that the earliest filing date of the instant application is well before the earliest filing date of *Martin*. Accordingly, the rejection of claims 1 – 11 under 35 U.S.C. 103(a) is improper and should be withdrawn for at least these reasons.

V. Claims 1, 2, 5 – 7, 10 and 11 are Patentable Over *Hayashi*

The Office Action rejected claims 1, 2, 5 – 7, 10 and 11 under 35 U.S.C. §102(b) as allegedly being anticipated by U.S. Patent No. 4,950,376 to Hayashi ("*Hayashi*"). For at least the reasons set forth below, the rejection should be withdrawn and the claims allowed.

Independent Claim 1

Applicants submit that independent claim 1, as amended, is allowable over *Hayashi* for at least the reason that *Hayashi* does not disclose, teach, or suggest each and every element of claim 1.

For example, without acquiescing to the allegation that the structural elements of *Hayashi* allegedly meet the elements of claim1 as previously recited, Applicants submit that at least the structure added to claim 1 through the instant amendment corresponding to the "pulse waveform power source adapted to electrically bias the additional structure to direct the electrons from the plasma towards the substrate" is not disclosed, taught, or suggested by *Hayashi.*

Unlike Applicants' apparatus of claim 1, which is used for the etching of material from a substrate using ***electrons***, *Hayashi* refers to ***ion*** etching (*See*, for example, col. 1, line 15; col. 1 line 26; col. 2, line 61). These techniques, such as reactive ion etching (RIE) and/or electron cyclotron resonance (ECR) etching (*a.k.a.* electron cyclotron enhanced RIE), are distinguished in at least paragraphs 11 – 15 of the present disclosure. The significance of these distinguishing features is apparent with reference to the amended claim language.

Specifically, the Office Action apparently alleges that the control electrode 30 of *Hayashi* discloses the claimed element of "additional structure." However, *Hayashi* discloses only that "the electric potential of the surface of the specimen is adjusted by controlling the direct current voltage applied to this electrode," (col. 2, line 67 – col. 3, line 2) via "a pair of positive/negative variable bias power sources 34" (col. 5, lines 62 – 63) for supplying the specified direct current voltage.

Thus, unlike the claimed "pulse waveform power source" *Hayashi* discloses only a "pair of positive/negative variable bias power sources." Additionally, for at least the reason that *Hayashi* discusses etching techniques using ions, *Hayashi* would not disclose,

teach, or suggest to one skilled in the art that such a pulse waveform power source could be used to "direct the electrons from the plasma towards the substrate" as recited in claim 1.

Accordingly, Applicants submit that claim 1 is allowable over *Hayashi* for at least the reason that *Hayashi* does not disclose, teach, or suggest "a pulse waveform power source adapted to electrically bias the additional structure to direct the electrons from the plasma towards the substrate" as recited in claim 1. Furthermore, dependent claims 2 – 11 and 19 – 22 are allowable for at least the reason that they depend from allowable independent claim 1.

Dependent Claims 2, 5 – 7, 10 and 11

Applicants submit that dependent claims 2, 5 – 7, 10 and 11 are allowable as a matter of law for at least the reason that claims 2, 5 – 7, 10 and 11 contain all the features and elements of independent claim 1, which Applicants believe to be allowable. For at least this reason, Applicants request that the rejection of claims 2, 5 – 7, 10 and 11 be withdrawn.

VI. Claims 3, 4, 8 and 9 are Patentable Over *Hayashi* in View of *Lee*

The Office Action rejected claims 3, 4, 8 and 9 under 35 U.S.C. §103(a) as allegedly being unpatentable over *Hayashi* in view of U.S. Patent No. 5,279,669 to Lee ("*Lee*"). Applicants submit that dependent claims 3, 4, 8 and 9 are allowable as a matter of law for at least the reason that claims 3, 4, 8 and 9 contain all the features and elements of independent claim 1, which Applicants believe to be allowable. For at least this reason, Applicants request that the rejection of claims 3, 4, 8 and 9 be withdrawn.

VII. Claims 16 - 18 are Patentable Over *Hayashi* in View of *Kofuji*

The Office Action rejected claims 16 - 18 under 35 U.S.C. §103(a) as allegedly being unpatentable over *Hayashi* in view of U.S. Patent No. 6,231,777 to Kofuji *et al.* ("*Kofuji*"). For the reasons set forth below, the rejection should be withdrawn and the claims allowed.

Independent Claim 16

Independent Claim 16, as amended, recites:

> 16. An apparatus for low-damage anisotropic low energy electron enhanced etching of a substrate, comprising:
>
> a plasma reactor;
>
> plasma creation means at least partially disposed within the plasma reactor for creating a plasma having positively charged ions and electrons;
>
> a substrate holder disposed within the plasma reactor for receiving a substrate, wherein the substrate holder is isolated from the plasma creation means;
>
> ***electron etcher means for etching the substrate received by the substrate holder with electrons from the plasma, wherein the electron etching means is in electrical communication with the substrate holder***; and
>
> charged particle controller means for controlling the flux of charged particles directed from the plasma onto a substrate disposed on the substrate holder, the charged particle controller means disposed proximal to the substrate holder.

(*Emphasis added*). Applicants respectfully submit that the proposed combination of *Hayashi* and *Kofuji* does not disclose, teach, or suggest at least the portions emphasized in bold text above.

The Office Action apparently alleges that the elements of the claimed plasma reactor, plasma creation means, substrate holder, and charged particle controller means are generally disclosed by *Hayashi*. (Office Action, pg. 6 - 7). However, the Office

Action indicates that "Hayashi *et al.* does not expressly teach an electron etcher means in electrical communication with the substrate holder" as recited in claim 16. Instead, the Office Action alleges that "Kofuji *et al.* teaches that an etcher means (pulsed electrical bias) is in electrical communication with a substrate holder. (Column 11, Lines 24 – 38)." (Office Action, pg. 7). The Office Action alleges that "it would have been obvious to one of ordinary skill in the art to modify the apparatus taught by Hayashi *et al.* to include an etcher means in electrical communication with the substrate holder." (Office Action, pg. 7). The Office Action further alleges that "while the combination of Hayashi *et al.* and Kofuji *et al.* does not expressly teach that the etching means is an electron etching means for etching the substrate with electrons, the pulsed electrical bias could inherently be used to cause electrons to impinge on the substrate." (Office Action, pgs. 6 – 7).

Applicants are in agreement with the Office Action statement that both *Hayashi* and *Kofuji* do not expressly disclose an etching means that is an electron etching means for etching the substrate with electrons. Rather, *Hayashi* and *Kofuji* are directed to ion etching. Accordingly, neither of the cited references disclose etching the substrate with electrons, yet the Office Action alleges that such a feature is obvious in light of the structure disclosed by the combination of *Kofuji* and *Hayashi*. Specifically, the Office Action alleges that the "the rejection is based on the fact the apparatus structure taught above has the inherent capability of being used in the manner intended by the applicant." (Office Action, pg. 8).

Applicants submit that the claimed "electron etcher means for etching the substrate received by the substrate holder with electrons from the plasma" can not possibly be said to be "inherent" by the cited references, as alleged. Specifically, the claim element is

presented in means-plus-function format. Thus, according to 35 U.S.C. 112, paragraph 6, the element should be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.

Applicants' claim 16 does not recite an "etcher means for etching." Rather, Applicants claim 16 specifically recites an "***electron*** etcher means for etching the substrate received by the substrate holder ***with electrons*** from the plasma" (*Emphasis added*). Accordingly, Applicants submit that neither *Hayashi* nor *Kofuji* can be said to disclose, teach, or suggest this claim element for at least the reason that neither reference discloses corresponding structure, material, or acts described in the specification for ***electron*** etching. Applicants submit that claim 16 should be allowed for this reason alone.

Applicants further submit that due to the difference in mass between electrons and ions, the mobility of electrons is greater than the mobility of ions. Additionally, electrons and ions appear in different quantities within the plasma and respond differently to the electrical fields they encounter. Accordingly, even assuming, *arguendo*, that the power voltage source 24 and pulse generator 17 used to generate the waveforms disclosed in *Kofuji* were attached to the apparatus of *Hayashi*, the waveforms generated could not be used to etch material with electrons from the plasma (and thus would not be equivalent to the claimed "electron etcher means for etching the substrate received by the substrate holder with electrons from the plasma").

Accordingly, Applicants submit that claim 16 is allowable over the proposed combination of *Hayashi* and *Kofuji* for at least the reason that *Hayashi* does not disclose, teach, or suggest "***electron etcher means for etching the substrate received by the substrate holder with electrons from the plasma***" as recited in claim 16.

Accordingly, Applicants respectfully submit that independent claim 16 is allowable over the proposed combination of *Hayashi* and *Kofuji* for at least these reasons. Furthermore, dependent claims 17 – 22 are allowable for at least the reason that they depend from allowable independent claim 16.

Dependent Claims 17 – 18

Applicants submit that dependent claims 17 – 18 are allowable as a matter of law for at least the reason that claims 17 – 18 contain all the features and elements of independent claim 16, which Applicants believe to be allowable. For at least this reason, Applicants request that the rejection of claims 17 – 18 be withdrawn.

VIII. Prior Art Made of Record

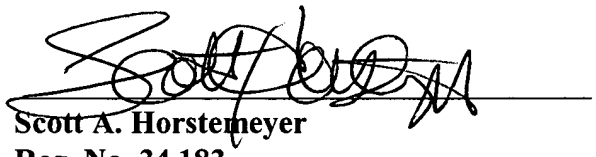
The prior art made of record has been considered, but is not believed to affect the patentability of the presently pending claims.

CONCLUSION

The Applicants respectfully submit that all claims are now in condition for allowance, and request that the Examiner pass this case to issuance. If, in the opinion of the Examiner, a telephonic conference would expedite the examination of this matter, the Examiner is invited to call the undersigned attorney at (770) 933-9500.

No fee is believed to be due in connection with this response. If, however, any fee is deemed to be payable, you are hereby authorized to charge any such fee to Deposit Account No. 20-0778.

Respectfully submitted,



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